

Tourism, Hospitality & Event Management

João Leitão
Vanessa Ratten
Vitor Braga *Editors*

Tourism Entrepreneurship in Portugal and Spain

Competitive Landscapes and Innovative
Business Models



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Editors

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João Leitão

I dedicate this book to my mum Kaye Ratten. I am thankful to have fond memories of our travels together including to the Xian Terracotta Warriors, Beijing, Bangkok, and Angkor Wat, amongst other places. I grew up listening to my mum talk about her time in Kampuchea (now Cambodia) and admiring the temple rubbings at home. It is thanks to my mum that I travelled to these places and had the education that I did. Thank you. I also thank my dad David Ratten, brothers Hamish Ratten and Stuart Ratten, sister-in-law Tomoki Ratten, and niece Sakura Ratten. Thank you.

Vanessa Ratten

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Vítor Braga

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The Role of Tourism Entrepreneurship in the Iberian Peninsula



João Leitão, Vanessa Ratten, Vitor Braga, and Roberto Antunes

Abstract This chapter highlights the importance of tourism for the sustainable development and economic growth of the Iberian Peninsula, both as a destination market and as a destination for investment and technological innovation, particularly through the accelerated digitalization of business models. The importance of fostering opportunity entrepreneurship is also justified, replacing the traditional forms of necessity entrepreneurship, as a lever for growth in the regions of the Iberian Peninsula, including those with low population density, which are opportunities to be explored with regard to the creation of new entrepreneurial units linked to quality of life, wellness, water and air quality, and spirituality. An agenda of business opportunities to be explored is presented, regarding the intensification of the use of new information and communication technologies in the tourism sector, tending to the digitalization of business models. The remaining 13 chapters that make up this volume, which is truly innovative in terms of mapping entrepreneurial initiatives in the tourism sector, as well as analysing the expectations of consumers of tourism

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services against the backdrop of the COVID-19 pandemic crisis, are briefly presented.

The importance of tourism for the Iberian economy is unquestionable, above all through exploitation of the natural resource capital favourable to exporting services and attracting flows of people, expenditure, and investment. The recent visibility of tourism entrepreneurship in the context of the global pandemic crisis, as well as the importance attributed to innovation and reinforcing the export capacity of tourism services makes it an appropriate time to produce a volume devoted to the subject of tourism entrepreneurship in the Iberian Peninsula. This region includes two countries with a common history and different resources, cultures, and landscapes including the Mediterranean Basin, the Algarve coast and the northern and western coasts of the Atlantic.

In terms of the literature considered relevant, Kibedi (1979) was one of the first authors to discuss tourism entrepreneurship, in the scope of a national study reporting the attempts by the Ministry of Industry and Tourism in Ontario (Canada) to train and educate business-people in tourism. However, it should be underlined that this remains a little-explored topic in the literature on entrepreneurship, as the presence of business activity in the sector is generally dealt with in a very wide-ranging way (Koh & Hatten, 2002). Entrepreneurship stresses opportunities to create and manage business initiatives (Zhao et al., 2011), and so is of considerable importance in the formation of tourist destinations. The study by Russel and Faulkner (2004) found a significant relation between innovative individuals (entrepreneurs) and a tourist destination's development. Also noted is the importance given to tourism entrepreneurship, especially in rural areas (Hernández-Maestro & González-Benito, 2014). These authors indicated that here, it is not just one more form of subsistence entrepreneurship, but rather the entrepreneurship of opportunity, pointing towards more evolved forms of qualified entrepreneurship in order to create supplementary income (Getz & Carlsen, 2000). These require articulation with the production and distribution of endogenous products, directed towards environmental transition, as well as intensive incorporation of new information and communication technology, aiming for full digitalization of business.

Added to this is the need to advance knowledge on forms of female entrepreneurship, especially in rural areas, leading genuine family-based businesses (Tinsley & Lynch, 2001). The presence of women in tourism entrepreneurship is also shown by the predominance of micro-firms linked to tourism, namely hotel and catering units (Getz & Carlsen, 2005). Concerning tourism entrepreneurs' motivation, the literature reveals that objectives related to a more rural, healthy, and sustainable lifestyle are particularly important, together with a desire to live in the village, build social networks and be an integral part of a community with its own identity (Bosworth & Farrel, 2011; Getz & Carlsen, 2000), or promoting endogenous products (Lopes et al., 2018) and certified productions with brands linked to places (Lopes et al., 2021).

These are examples of different motivations; it will be interesting to explore in future studies, as entrepreneurs' preferences seem to be changing towards a culture of greater quality of life and a certain emotional and spiritual balance. The aim is to ensure people's internal balance, something in short supply in places with a greater density of population and economic activities.

In tourism entrepreneurship, the place and territorial component cannot be separated from the product/service, being an integral part of both the tourism supply and demand. This is a differentiating element, not only in the Iberian Peninsula explored here, but also in each and every location, where the place, its bio-diversity, natural resources, customs, and cultural heritage affect the interaction between both sides of the market, making them unique, authentic, and unrepeatably.

In this line of thought, previous studies indicate that the identity of local tourism entrepreneurs has a direct and significant influence on business self-efficiency and the support given to the community, which translates into the improved performance of business units (Hallak et al., 2012, 2015). Few studies focus on the tourism entrepreneur ecosystem, despite finding relevant indications with regard to rural tourism (Dana et al., 2014; Kline et al., 2014), forming the above-mentioned but little-explored dimension of the place.

A good starting point for future studies on tourism entrepreneurship should be based on exploring established theories, such as Transaction Cost Theory, the Theory of Resources and Capacities, Network Theory and Stakeholder Theory. However, new research initiatives can be more ambitious and try to explore the adherence of theoretical approaches included in the body of Entrepreneurship Theory, namely the Theory of Knowledge Filter, the Theory of Dynamic Competences and, more recently, the Theory of Entrepreneurial Ecosystems.

In strategic and operational terms, one of the lines of public policy action to explore in the Iberian Peninsula, as regards tourism entrepreneurship, has to include positioning this differentiated area as a centre of international reference in innovation and entrepreneurship, in relation to environmental and digital transition.

According to the important statement of an invited practitioner, Roberto Antunes, the Executive Director of NEST, Tourism Innovation Center, Portugal, we can expect tourism entrepreneurship to contribute to changing the tourism system. As in society in general, so far there has been an excessive focus on quantifiable results and less on people, so we will have to reformulate everything and focus more on other intangible, sustainable, environmental, emotional, and spiritual aspects.

Regarding environmental transition, and incorporating what we are still learning from the current pandemic, travellers will be more demanding in terms of their choice of airlines, cruises, apartments, hotels, and other providers. In addition, tourism will have to concentrate on sustainability and proximity, to recover. It will be necessary to reduce accommodation and improve the infrastructure in many crowded areas of the Iberian Peninsula, as well as devoting renewed efforts to low-density, peaceful destinations.

Inland tourism will benefit greatly from this new form of development. Spain is moving towards transformative tourism where we must specify the extension of the resort model (traditional model) to urban centres and "exclusive" areas, with tourism

activity linked to the maintenance of networks of affection and long-term labour, cultural and social activism collaborations. In turn, Portugal has developed interesting projects concerning historical villages and is launching new initiatives devoted to knowledge of rural villages and interconnectable rural hubs.

Looking ahead, tourism will establish itself as future-oriented industry, able to generate positive sustainable impacts rather than being an opportunity for positive economic shifts. It can become a force for good and will become more professional the more it pushes its strategies to deliver qualitative positive impacts. Furthermore, tourism will force a global discussion more than any other, being probably the third biggest export in the world and requiring more connection and alignment rather than sovereignty and economic egoism.

Portugal and Spain are good examples of tourism entrepreneurship with a developed infrastructure in the service sector, ranking among the most visited countries in the world and attracting millions of travellers annually due to their beaches and pleasant weather, the abundant artistic heritage of both countries and the gastronomy. In addition, these two nations are very rich in terms of cultural heritage at a global level, due to the large number of civilizations that left their mark and legacy on the Iberian Peninsula.

Both can represent a paradigm of being developed economies in which tourism is one of the major industries and provides wealth, well-being, and employment. Especially in Portugal, value is generated by thousands of micro and small companies, and entrepreneurs, and this is an opportunity as it builds tourism with thousands of repertoires, curiosities, and unheard narratives, i.e. what tourists now look for. This does not happen in highly concentrated markets, where the offer is extensive and in the hands of a few. Also promising is their predominance when it comes to achievements in sustainability. Portugal and Spain are well positioned to be world-wide references in this matter.

Regarding digital transition, since the pandemic, the adoption of digital tools has been enormous. Solutions have been met for eliminating distance. Chatbots, QR codes, biometrics reading, and others are now a reality, but also for promoting social inclusion and providing an effective answer to special needs and disabilities. A new reading of the changes in demand has opened up great opportunities for entrepreneurs, for example, to succeed in attracting Digital Nomads, when even during the pandemic, demand has been greater than the supply.

Considering the new trends and the rapid changes occurring, the tourism sector in the Iberian Peninsula should be strengthened, by supporting different forms of tourism entrepreneurship, through planned, articulated activities in the public and private sphere, namely by:

- (1) Stimulating an entrepreneurial culture through developing entrepreneurship programmes in the hotel and tourism school network and other initiatives targeting micro, small, and medium-sized companies, and business-people in the sector, as well as supporting events to share good entrepreneurial practices;

- (2) Promoting access to finance sources, developing and managing lines of financial support for entrepreneurship, and promoting initiatives to join start-ups and investors;
- (3) Facilitating innovation in tourism, giving specialized support to start-ups in terms of knowledge transfer and advice, regarding financing instruments and support for the internationalization of start-ups, through participation in international tourism fairs;
- (4) Matching the tourism demand for, and supply of, endogenous products, with brand certification and image, linked to the bio-economy and sustainability;
- (5) Promoting the adoption of circular economy and eco-efficiency practices, in relation to Sustainable Development Goals (SDGs) in activities of tourism entrepreneurship; and
- (6) Stimulating the entrepreneurial ecosystem, promoting agents' coordination, forming partnerships in developing programmes of horizontal and vertical acceleration in tourism, forming a network of incubators, and developing a network of mentors to promote new ideas and projects in tourism.

As proposed by Leitão et al. (Leitão et al., 2021), on the one hand, the relation between entrepreneurship and innovation, and on the other, the relation between innovation and competitiveness, mean that the study of tourism entrepreneurship is of fundamental importance for tourist regions' sustainable development and resilience. It is imperative to consider tourism as a sector of activity that can promote the crossed fertilization of different sectors of economic activity, contributing to greater differentiation of the industrial vertical chains linked to endogenous resources, and to intelligent diversification of production based on horizontal specialization of economic activities where the Iberian Peninsula has comparative advantages, in terms of scale and cultural heritage. This involves policy-makers, scholars, and above all entrepreneurs, who are the drivers of change.

The present volume contains a collection of 15 chapters presenting diverse contributions on the importance of tourism entrepreneurship in the Iberian Peninsula, providing readers with an enriching journey through new trends in tourism and education directed towards tourism entrepreneurship and innovation. It reveals this ancient and multi-faceted territory as an international reference for entrepreneurship, investment, and experimentation in tourism.

After the foreword, in Chap. 2, Figueiredo, Soares, and Costa provide a thoughtful piece of research, categorizing the actors influencing the drivers of access to digital technology in the ecosystem of innovative tourism services. In addition, the influence of alternative factors or drivers is evaluated, with emphasis on situations where there is more than one driver, and more than one evaluator.

In Chap. 3, Machado, Vareiro, Sousa, and Mendes address rural tourism in an innovative way by making use of both physical and emotional experiences. The authors argue that the personalized encounter between places, people/culture, and guests, characteristic of rural accommodation and the village context, can play a central role in the quality of the tourist experience in these areas.

Chapter 4 contains a challenging journey guided by Rocha, Tarrés Falcó, and Leitão, arguing that spirituality and mindful tourism can enhance economic activities in rural towns and villages with no tourism tradition. The authors use a self-narrative method to describe the second author's experiences in mindful travel projects, courses, congresses, and ventures, and discuss mindful tourism, revealing innovative Hispanic cases, as well as providing guidelines for future investigations and innovative entrepreneurial projects in the Iberian Peninsula.

In Chap. 5, Braga and Silva explain the strategies used by the hosts or owners of manor houses to ensure the self-sustainability of Historic Housing Tourism. The research findings, based on conceptual hypotheses derived from the literature, point out that a substantial number of these houses can no longer depend economically on agriculture, since the primary sector has lost relevance in the local economy. Thus, a new logic of multi-functionality for rural areas is required, taking into consideration the value added through cultural and natural heritage.

Chapter 6, by Pereira, Fonseca, Sousa, and Correia, based on the case of the Iberian Euroregion of Galicia and Northern Portugal, analyses stakeholders' perceptions of cooperation as a strategy to enhance new dynamics for a common tourist destination. The authors analyse several alternative marketing strategies and actions, to enhance the region as a tourist destination.

In Chap. 7, Rengifo Gallego, Sánchez Martín, Sánchez Rivero, Martín Delgado, and Rodríguez Rangel present an original approach to the role played by social networks in promoting rural tourism destinations. The authors study rural accommodation in Extremadura, based on the hypothesis that Facebook promotes the visibility of its rural tourism establishments. A Grouping Analysis is applied both with and without spatial restriction, to determine the presence of spatial clusters. The main findings outline the need to incorporate Facebook actively as a basic tool for better performance derived from the positioning of accommodation.

Chapter 8, by Lopes, Leitão, and Rengifo Gallego, assesses to what extent local agri-food products serve as brands of their places of origin and local drivers of creative tourism. Four case studies are presented: Cereja do Fundão (Cherries of Fundão) and Queijo Serra da Estrela (Serra da Estrela cheese) from the Portuguese Central Region, and Cereza del Jerte (Cherries from Jerte) and Torta del Casar (Torta del Casar cheese) from Spanish Extremadura. The empirical findings reveal that the four agri-food products studied are catalysts for tourism activities and events in their places of origin. In addition, these same products are drivers of a range of creative tourism activities.

In Chap. 9, Almeida and Belezas present an interesting study following the effects of the Covid-19 pandemic, positioning remote work and digital nomadism as new entrepreneurial opportunities that can be used by peripheral territories to attract an emerging target group called half-tourists. Two reference projects are assessed, namely Digital Nomads Madeira (Portugal) and Nomad City Gran Canaria (Spain). Through in-depth interviews with the people implementing these strategies, new insights arise concerning the barriers and best practices to innovate in tourism strategies in peripheral places.

Chapter 10, by Travanca, Vieira, and Félix, examines the impact of both internal (e.g. size, age, growth, and debt) and external factors (e.g. real GDP growth rate, sovereign debt crisis, and location) on the profitability of Portuguese tourism firms. Using a panel data analysis, applied to a sample of micro, small, and medium-sized firms, from 2009 to 2017, the empirical findings reveal that profitability is positively affected by firms' size and age and by real economic growth rates. Conversely, the firm's indebtedness ratio and the sovereign debt crisis denote a negative influence. Firms in the main tourism regions are generally more profitable, and relatively less affected by the sovereign debt crisis, which was particularly harmful to micro-firms.

In Chap. 11, Martínez-Puche, Amat, Cortes, Larrosa, Lorente, Ortiz, and Sáncho study a training programme devoted to Smart Tourism Development, illustrating the process, the content of the training programme, the topics and the methodology used, based on the experience of the University of Alicante, targeted to the development of this type of training programme linked to tourism, reinforcing the importance of an integrated rural and territorial approach, with the local population as a fundamental pillar. Technological aspects must be considered, to ensure that "smart rural spaces" are accessible, connectable, and participatory, in order to improve the tourist experience.

Chapter 12 presents a qualitative study by Silva, Silva, and Alves, who assessed the importance of events in promoting a tourist destination, identifying the themes of the events used for that promotion and the role of events in promoting a tourist destination. This study was conducted by local authorities in the north of Portugal that held entertainment, cultural, sports, and educational events. The main findings revealed that those events attracted plenty of visitors, had a good economic impact on the region, and contributed to increased consumption and greater dissemination of their products, facilitating potential new contacts for business and partnerships.

In Chap. 13, Banha, Graça, and Ganha provide an original contribution devoted to the still unexplored topic of tourism entrepreneurship education. The authors present a case study applied to the Tourism Creative Factory programme, in order to identify the methodologies used to foster and promote an entrepreneurial culture throughout the different regions of the country, but also to assess the part this programme played in attaining the strategic goals set by Portugal Tourism. The analysis of this case study may be able to shape the creation of future evidence-based policy-making around entrepreneurship education or encourage further research related to the history and evolution of tourism in Portugal.

Lastly, Chap. 14, by Estevão, Duarte, Cabral, Campón-Cerro, and Yuliati, assesses safety perception and service needs in the Covid-19 situation by exploring seven critical dimensions. The findings indicate differences between Spanish and Portuguese hotel guests in all categories, with special incidence in hygiene-related factors. The differences vary according to gender, and women seem to be more sensitive to safety as they present more differences than men. Level of education and having children also affect the perception of hotel safety and guests' requirements. The need to prove hygiene and having the hotel certificate for Covid-19 emerged as key factors in restoring the client's trust.

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Tourism Services Innovation Ecosystem: A Multicriteria Model Approach Based on Portuguese Higher Education



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Abstract In recent years, researchers and practitioners shed light on the “platform ecosystem.” The platform ecosystem could create an ecosystem that generates unlimited tourism innovation with an open platform, outside complementors, and various consumers [Inoue and Tsujimoto (Technological Forecasting and Social Change 136:235–253, 2018)]. The main objective of this research is to categorize or sort the actors that influence the drivers to access digital technologies tourism services innovation ecosystem. We evaluate the influence of alternatives over factors or drivers, with emphasis on situations where there is more than one driver and even more than one evaluator. The perceptions were mapped by the board of the Portuguese faculty. This challenge arises in subjective situations where perceptions should be mapped as it occurs in multicriteria decision aid/making situations. Roy (Revue Française d’informatique et de Recherche Opérationnelle 2:57–75, 1968) proposed the ELECTRE (ELimination et Choix Traudusiant La REalité) as a non-compensatory algorithm to face choice dilemmas. The assertive “alternative **a** is not worse than another one **b**.” We expect that results may encourage practitioners and researchers to influence decisions to access the innovation ecosystem.

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1 Introduction

In management research, the use of the term “platform” has been on the increase (Thomas et al., 2014). And recently, researchers and practitioners have agreed on using “platform ecosystem” (Inoue & Tsujimoto, 2018). Thus, some researchers as Thomas et al. (2014) have clarified this concept by assuming it as the platform (system or architecture) and complementary assets or products. Thomas et al. (2014) present this concept as a result of combining the literature of product family and the market intermediary platforms. Besides, an ecosystem that generates unlimited innovation with an open platform, outside complementors, and several consumers could be formed through this platform ecosystem. Likewise, Inoue and Tsujimoto (2018) pointed out that the competition between two platform ecosystems in the same market and the constructed theoretical models of indirect network effects between complementors and consumers are the focus of many studies. Furthermore, becoming a complementor may be attractive, and various platforms attempt to attract them in order to be more valuable to the other participants, since the platform only offers the basic infrastructure, useful boundary resources, and access to its ecosystem (Kenney et al., 2019).

In recent years, there has been increasing attention regarding the service innovation ecosystem platform and an attempt to promote it to cultivate favorable environments systematically and encourage local innovators to create knowledge and capture business value (Xu et al., 2018). The concept of the service innovation ecosystem platform is receiving mounting attention worldwide. Governments and industrialists are keen to foster innovation ecosystems. Since evaluating the influence of alternatives over factors or drivers is a key element, especially when there is more than one driver and even more than one evaluator, the current research aims to categorize or sort the actors that influence the drivers to access digital technologies services innovation ecosystem. This problem rises in subjective situations where perceptions should be mapped as it occurs in multicriteria decision aid/making situations.

The ELECTRE (ELimination et Choix Traudusiant La REalité) method proposed by Roy (1968) as a non-compensatory algorithm to face choice problems is applied to calculate the degree of concordance ($C(a,b)$) with the predicative “alternative **a** is not worse than another one **b**.” The results highlighted that there is a need to align CEO and other members’ perspectives, since the CEO favored a disruptive innovation while the other respondents leaned toward an incremental innovation. Nevertheless, results also demonstrated that this unalignment does not cause relevant disagreement around the perception of the influence of the actors that appear in **A** on the drivers of the innovation ecosystem that compose **F**. Moreover, these results demonstrated that “People” were perceived as the most influencer factor on the innovation ecosystems, for both perspectives, as well as Actor Support, Time, Support from Mentors, and Infrastructure were the actors identified as having positive influence on the innovative ecosystem.

The research is structured as follows: Sect. 2 presents a literature review on the digital technologies services innovation ecosystem. Section 3 outlines the methodology of the research, based on the Multicriteria Decision Modeling, and applying the ELECTRE proposed by Roy (1968). Section 4 discusses the results reached by running the steps described in Sect. 3 and presents the implications of the research. Finally, Sect. 5 identifies the limitations of the research that should be considered in future research.

2 Literature Review

Under enhanced global competition and proliferation of information communications technologies (ICT), economic activities have become more knowledge-intensive services, and industrial economies have accelerated their transition to technological knowledge-based systems (Russell & Smorodinskaya, 2018) to create a quality approach. In services, quality can be identified as the outcomes compared with customers' expectations, and service innovation can be regarded as service outcomes beyond their expectations (Yeh, 2020). Service innovation has been considered a major factor in economic growth and ecosystem development (De Silva et al., 2018).

An ecosystem is defined as "A biological system composed of all the organisms found in a physical environment, interacting with it and each other" (Tsujimoto et al., 2018, p. 16). In recent years, researchers and practitioners shed light on the "platform ecosystem." The platform ecosystem could create an ecosystem that generates unlimited innovation with an open platform, outside complementors, and various consumers (Inoue & Tsujimoto, 2018).

In addition, many platforms try to attract complement providers to make the platform more valuable to other participants. Becoming a complementor may be attractive, as the platform offers the basic infrastructure, useful boundary resources, and access to its ecosystem (Kenney et al., 2019).

The concept of the service innovation ecosystem platform is receiving increasing attention worldwide. Governments and industrialists are keen to foster innovation ecosystems to systematically cultivate favorable environments and encourage local innovators to create knowledge and capture business value. Innovation ecosystems require specific attention when faced with fast-developing and emerging industries that closely link science, technology, and business (Xu et al., 2018).

According to Cukier and Kon (2018), startup ecosystems cannot be analyzed as static entities. Like biological ecosystems, they behave like living organisms and change over time. Some changes are planned or somehow controlled, while others result from unexpected forces acting within and outside the ecosystem. In other words, ecosystems acknowledge that firms do not operate in a vacuum and are in fact embedded in the broader social, cultural, and institutional context that shapes their growth and contributes to their chances of success (Jha, 2018).

Furthermore, a digital service ecosystem is a new kind of self-organized environment that addresses openness and dynamicity, enabling collaborative innovation and co-creation among ecosystem members (Immonen et al., 2016).

Digitalization aids services in manufacturing companies, creating new opportunities for different services, platforms, intelligent products, and novel business models (Kohtamäki et al., 2019).

Together, digital technologies enabled the creation of new business ventures and digital startups and incorporated novel technology as a vital component into business models and operations (Elia et al., 2020).

Similar to what happens in incubators, organizations that promote the development of entrepreneurial companies, help them to survive and develop during the initial phase when they are most vulnerable (Tietz et al., 2015).

In today's information society, the concept of an information ecosystem highlights the connection between the properties of an increasingly complex digital informational environment with many types of data available (e.g., accounting information from companies, information from capital markets, statistics on the evolution of consumer and business sentiment) as per Zorio-Grima and Merello (2020).

The concept of disruptive innovation describes how new technology alters a performance improvement trajectory or redefines how performance is understood (Beltagui et al., 2020). According to Beltagui et al. (2020), most radical innovations or new technologies follow an evolutionary pattern of a combination of pre-existing modules, components, and subsystems.

In contrast, incremental innovation is an innovation with a lower degree of novelty, risk, and cost than radical innovation (Martínez-Ros & Orfila-Sintes, 2009), though with considerably less potential for positive impact on a firm's performance.

Parida and Wincent (2019) stated that trends such as digitalization, the circular economy, services, and their associated new business models present a unique value creation opportunity. However, they also entail several challenges associated with greater risk and responsibility related to significant changes in a firm's ecosystem.

Thus, faculties support knowledge spillovers to improve sustainable entrepreneurial ecosystems that benefit economic revitalization or further the development of regions (Wagner et al., 2019). Moreover, strategies should be implemented in order to promote the participation of the main actors involved in the entrepreneurial and innovation tourism ecosystem to ensure the success of technology transfer policies and legislation (Guerrero & Urbano, 2019).

According to Milwood and Maxwell (2020), innovation and entrepreneurial ecosystem was defined as a community comprising actors and their activities of production and service, have roots in ecological biology, regional development, or closely related fields of systems, networks, and actors. In addition, the ecosystem concept is becoming increasingly important in the field of technology management (Morant-Martínez et al., 2019). Finally, the digital revolution is radically changing the world we live in (Pencarelli, 2020).

3 Methodology

This section is designed to highlight the main concepts used in the proposal, covering the following streams, technology, and tourism innovation ecosystem:

3.1 Multicriteria Decision Modeling

To evaluate the influence of alternatives over factors or drivers is a relevant issue, with emphasis on situations where there is more than one driver and even more than one evaluator. This problem arises in subjective situations where perceptions should be mapped as it occurs in multicriteria decision aid/making situations.

Roy (1968) proposed ELECTRE (ELimination et Choix Traudusiant La REalité) as a non-compensatory algorithm to face choice problems. The fundamental core of ELECTRE is based on building outranking relations, so an alternative **a** outranks another one **b** if its performance is not the worst in most of the criteria considered. Roy (1968, p. 8) proposed a mathematical formulation to calculate the degree of concordance ($C(a,b)$) with the assertive “alternative **a** is not worse than another one **b**.” It follows this formulation as written in Costa (2016)

$$C(a,b) = \frac{1}{\sum_{j=1}^n w_j} \sum_{j=1}^n c_j(a,b)w_j \quad (1)$$

Where,

- a and b are generic alternatives
- $C(a,b)$ is the whole concordance degree with the assertive a is not worse than b
- w_j is the weight of the j th criterion
- n is the number of criteria
- $c_j(a,b)$ is a “local” concordance with the assertive a is not worse than b .

Thus, as reported by Roy and Skalka (1985), when comparing crisp values (or using true criterion), the local concordance is calculated by applying the Eq. (2).

$$c_j(a,b) = \begin{cases} 1, & \text{if } g_j(a) \geq g_j(b) \\ 0, & \text{otherwise} \end{cases} \quad (2)$$

Where $g_j(a)$ and $g_j(b)$ are, respectively, the performance or grade of the alternatives a and b , in the criterion j . For situations with no crisp values or using pseudo criterion as defined in Roy and Skalka (1985), the local concordance is calculated as it appears in Eq. (3).

Table 1 ELECTRE Family of multicriteria methods

Problematic	Method	References
Choice	ELECTRE I	Roy (1968)
	ELECTRE IS	Roy and Skalka (1985)
Ranking	ELECTRE II	Roy and Bertier (1971)
	ELECTRE III	Roy (1978)
	ELECTRE IV	Hugonnard and Roy (1984)
Sorting	ELECTRE TRI	Yu (1992), Mousseau and Slowinski (1998)
	ELECTRE TRI-C	Almeida-Dias et al. (2010)
	ELECTRE TRI-nC	Doumpos and Figueira (2019)

Source: Adapted from Nepomuceno and Costa (2015)

$$c_j(a, b) = \begin{cases} 1, & \text{if } g_j(a) \geq g_j(b) - q_j \\ \frac{g_j(a) - g_j(b) + p_j}{p_j - q_j}, & \text{if } g_j(b) - p_j \leq g_j(a) < g_j(b) - q_j \\ 0, & \text{if } g_j(a) < g_j(b) - p_j \end{cases} \quad (3)$$

Where p_j and q_j are, respectively, preference and indifference thresholds. It is interesting to notice that Eq. (2) is a particular case of Eq. (3) when $p_j = q_j = 0$.

As reported by Rodriguez et al. (2013), the ELECTRE algorithm was deployed in several situations, but only to induce other kind of issues beyond the choice problem. This development has generated the ELECTRE family of outranking multicriteria methods, as noted in Table 1.

Most of the methods that appear in Table 1 are designed for a unique decision unity. That is, if there is more than one evaluator, their evaluations should be pre-processed in order to obtain a unique evaluation for each alternative or object in each criterion.

3.2 *Electre Tri Me*

The methods that appear in Table 1 are non-compensatory ones proposed for decision situations with only one evaluator. Recently, it appears that the ME (multiple evaluators) family of non-compensatory methods, ELECTRE ME (Costa et al., 2018), preserve the non-compensatory features of ELECTRE even when using evaluations that come from several evaluators. A variation of such ME proposal is the ELECTRE TRI ME designed for sorting multicriteria and multiple evaluator outranking approach alternatives or objectors into categories. As reported by Costa and Duarte (2019) and Costa et al. (2020), the assumptions and formulas shown in Table 2 should be adopted when applying ELECTRE TRI ME. After these assumptions, the ELECTRE TRI ME compares each alternative in **a** against each profile in

Table 2 ELECTRE family of multicriteria methods

Element	Formula	Description
Alternatives	$A = \{a_1, a_2, \dots, a_i, \dots, a_m\}$	a set composed by m alternatives.
Evaluators	$E = \{e_1, e_2, \dots, e_j, \dots, e_n\}$	a set of n evaluators.
Criteria	$F = Fe_1 U Fe_2 U \dots U Fe_j U \dots U Fe_n - 1 U Fe_n$	$Fe_1 = \{k_{1e1}, k_{2e1}, \dots, k_{ve1}\}$ is the subset composed by the v criteria adopted by the evaluator e_1 ;
		$Fe_n = \{k_{1en}, k_{2en}, \dots, k_{zen}\}$ is the subset composed by the z criteria adopted by the evaluator e_n
Weight of the criteria	$W = We_1 U We_2 U \dots U We_j U \dots U We_n - 1 U We_n$	$We_j = \{w_{1ej}, w_{2ej}, \dots, w_{vej}\}$ is the subset composed by the criteria weights under the perspective of the evaluator e_j .
		$We_n = \{w_{1en}, w_{2en}, \dots, w_{zen}\}$ is the subset composed by the criteria weights under the perspective of the evaluator e_n .
Performance of the alternatives	$G(a) = Ge_1(a) U Ge_2(a) U \dots U Ge_{j-1}(a) U Ge_n$	$Ge_1(a_i) = \{g_{1e1}, g_{2e1}, \dots, g_{ve1}\}(a_i)$ is the subset composed by the performance of alternative a_i under the perspective of the evaluator e_1 and the criteria set adopted by this evaluator.
		$Ge_n = \{g_{1en}, g_{2en}, \dots, g_{zen}\}$ is the subset composed by the z criteria adopted by the evaluator e_n and the criteria set adopted by this evaluator.
Categories	$C = \{C_1, C_2, \dots, C_h, \dots, C_{p+1}\}$	C is the set of p categories in which the alternatives will be sorted. These categories are ranked from the worst (C_1) to the best (C_{p+1}). All evaluators should have the same number of categories, in such away h has the same value for all the evaluators.
Boundaires or profiles	$B_{kej} = \{b_1, b_2, \dots, b_h, \dots, b_p\}$	B is a set composed by p profiles or boundaries that delimit the categories for a criterion k, under the viewpoint of an evaluator e_j . As the categories are adjacent, b_h is both the superior limit of C_h , and the inferior limit of C_{h+1} . In a more general way, considering that there should exist n evaluators:
		$B = Be_1 U Be_2 U \dots U Be_j U \dots U Be_{n-1} U Be_n$
		OR
		$B = \{\{b_{1e1}, b_{2e1}, \dots, b_{te1}\}, \{b_{1e2}, b_{2e2}, \dots, b_{te2}\}, \dots, \{b_{1ej}, b_{2ej}, \dots, b_{tej}\}, \dots, \{b_{1en}, b_{2en}, \dots, b_{ten}\}\}$ (8-b)
		Where B is the overall vector of profiles, t is the number of profiles, and e_k , is the k evaluator.

Source: Author's creation

b according to Eq. (4) if using crisp or integer value, or Eq. (5) if using pseudo-criteria.

$$c_j(a, b_h) = \begin{cases} 1, & \text{if } g_j(a) \geq g_j(b) \\ 0, & \text{otherwise} \end{cases} \quad (4)$$

$$c_j(a, b_h) = \begin{cases} 1, & \text{if } g_j(a) \geq g_j(b) - q_j \\ \frac{g_j(a) - g_j(b) + p_j}{p_j - q_j}, & \text{if } g_j(b) - p_j \leq g_j(a) < g_j(b) - q_j \\ 0, & \text{if } g_j(a) < g_j(b) - p_j \end{cases} \quad (5)$$

After calculating the concordance degree $C(a_j, b_h)$, the ELECTRE TRI ME compares such values against a cut-level λ using a top-down or descendent direction (from the lower profile of the upper category to the upper profile of the lower category), and classifies the alternative a_j into the first category for which $C(a_j, b_h) \geq \lambda$. Check Table 2.

4 Results

In this section, we present all the results reached by running the steps described previously.

4.1 Setting the Situation in Which the Modeling Was Applied

The main objective of this paper is to categorize or sort the actors that influence the drivers to access the tourism innovation ecosystem. As a first step, it is necessary to set the problem situation, which comprises the context, the alternatives, the criteria, and the categories in which the actors will be classified.

The situation in which the modeling was applied is adequate to the proposal because the organization undergoes a major strategic change in the business model, migrating from an “analog” system to a “digital” system, blended learning and hybrid in terms of teaching and learning. Complements and highlights relevance with the proposal of a new concept of innovation and entrepreneurship laboratory, aligned with the organization’s strategic drivers.

Thus, Innovation Lab (Ilab) will be considered a strategic tool to support the transition of the business model, focused on innovation drivers, digital technological entrepreneurship, and startups. In its quest for speed and innovation, the tech industry has produced a variety of ways of engaging with startups (Prashantham & Kumar, 2019).

This model was developed to better understand the objects or alternatives, maturity levels, and type of tourism innovations, as it appears in Fig. 1.

The set of objects to be evaluated or alternatives (A) was composed as follows:

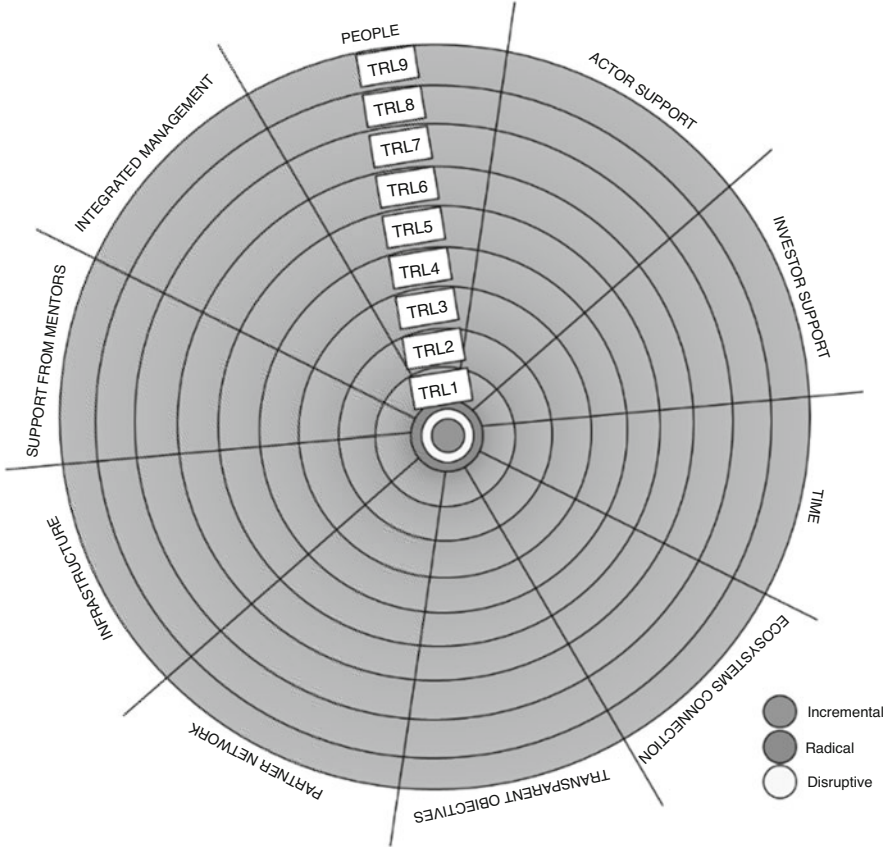


Fig. 1 Drivers to access the digital technologies tourism services innovation ecosystem. Source: Author’s creation

$A = \{\text{People; Integrated management; Actor Support; Investor Support; Mentors Support; Infrastructure; Time; Connection with Ecosystems; Transparent Objectives \& Partner Network}\}.$

The choice of the alternatives (A) is due to the fact that these are actors that influence the innovation features of the university, as concluded from the bibliographical review about factors that influence university power to innovate.

The sample of evaluators was composed of three members of the university’s decision-making staff and a professor (head of Innovation Lab) closely involved in the business innovation transformation of this university (refer to Table 3).

The innovation maturity levels described in technology readiness levels (TRL’s) developed by The National Aeronautics and Space Administration (NASA) were considered as the drivers or the criteria in the multicriteria evaluation mode. As the criteria are set to be the same for all evaluators, we have:

$$F = F_{E1}UF_{E2}UF_{E3}UF_{E4}$$

Table 3 The sample profiles

Code	Enrollment
E1	Vice-Rector
E2	Dean of School of Business and Social Sciences
E3	Head of Innovation Lab
E4	CEO

Source: Author's creation

Table 4 The Likert-based categories

Code	Linguistic meaning
A	<i>Very positive influence</i> on the driver
B	<i>Positive influence</i> on the driver
C	<i>No influence</i> on the driver
D	<i>Negative influence</i> on the driver
E	<i>Very negative influence</i> on the driver

Source: Author's creation

Where

FE1 = FE2 = FE3 = FE4 = {TRL1: basic principles observed, TRL2: technology concept formulated, TRL3: experimental proof of concept, TRL4: technology validated in lab, TRL5: technology validated in relevant environment (industrially relevant environment in the case of key enabling technologies), TRL6: technology demonstrated in relevant environment (industrially relevant environment in the case of key enabling technologies), TRL7: system prototype demonstration in operational environment, TRL8: system complete and qualified, and TRL9: actual system proven in operational environment (competitive manufacturing in the case of key enabling technologies, or in space).

Based on the Likert scale, the actors were classified into categories defined as C = {A, B, C, D, E}. The definitions of these categories are presented in Table 4.

4.2 Collecting Evaluations from the Sample

After the problem situation was set, the collection of evaluations from the evaluators was performed. A google form (available in <https://forms.gle/CFnDNVryZFkBjBAh9>) was sent to the sample members. In the first part of the form, we ask the respondents for feedback on what kind of innovation system (incremental, radical, or disruptive) and flow (open or closed) they have in mind when answering the proceeding questions in the form. E1, E2, and E3 answered that they have incremental innovation in mind, while E4 chose the disruptive innovation choice, and all the members of the sample opted for “open” innovation.

In the second part of the form, we ask the members of the sample about their perception regarding the influence of the actors that appears in A over the drivers that compose F. They emitted their answers, taking into account the Likert-based scale that appears in Table 5. In the first column of this table, we have the linguistic value